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turned so as to compensate in a measure for the abnormal position in which the fish is placed. Lee showed that these compensatory movements may be called forth by stimulating the sense organs of the semicircular canals in a quiet dogfish resting in a normal position, and he therefore believed that the normal compensatory movements of the eye were reflexes produced by a stimulation of the organs of the semicircular canals. E. P. Lyon¹ has made the interesting discovery that certain eye movements can be produced without the intervention of the semicircular canals. If the tail of a dogfish is turned to one side, the eye of the same side is directed forward, that of the opposite side, backward. As this experiment succeeds after the eighth nerves are cut, it follows that this reflex is not to be regarded as originating in the ear. Moreover, when the spinal cord is divided well forward in the body, the reflex ceases, and the author, therefore, rightly concludes that the sensory disturbances, which give rise to the reflex, are located in the posterior part of the trunk and make their way forward through the cord. The author finally calls attention to the uncertainty of compensatory movements of the eye as evidence of stimulation of the organs in the semicircular canals.

P.

Development of Lepidosiren. — The development of this rare and interesting fish is being worked out by J. Graham Kerr,² whose first paper on the subject gives an account of the way in which eggs may be obtained and the external features of their development. The eggs are laid in underground burrows in swamps. The fertilized egg as taken from the nest is enclosed in a thin, horny capsule, round which is occasionally a jelly-like envelope. Segmentation is complete and unequal, as in *Amia*. The gastrula closely resembles that of *Petromyzon*. The medullary folds are low, and the neural axis arises mainly as a solid down-growth. There is no neurenteric canal. Four external gills are developed upon branchial arches, I, II, III, and IV. Auditory and nasal sacs and stomodæum are formed by secondary excavation of originally solid rudiments. The young fish, which at hatching is tadpole-like, remains two weeks without developing pigment, after which the retinal pigment begins

¹ Lyon, E. P. Compensatory Motions in Fishes, *Amer. Journ. of Phys.*, vol. iv (1900), pp. 77-82.

² Kerr, J. Graham. The External Features in the Development of *Lepidosiren paradoxa* Fitz, *Phil. Trans. Roy. Soc. London*, Ser. B, vol. cxcii (1900), pp. 299-330, Pls. VIII-XII.

to appear. The fore and hind limbs suffer rotation, so that the resultant upper surface of either is homologous with the lower surface of the other, as in *Ceratodus*. Pulmonary breathing begins before the external gills show signs of degeneration. About six weeks after hatching, the external gills are lost. The young *Lepidosiren* is remarkably newt-like in its general appearance and uses its hind limbs in clambering about the vegetation. It also has some powers of change of color by the action of its chromatophores. P.

Multiplication of Nuclei in Transversely Striped Muscle Fibres of Vertebrates.¹—Godelewski's work, of which he gives a preliminary account, was carried on at the Anatomical Institute of the Jagellonian University at Krakow. The material was from late embryos and recently born young of the guinea pig and mouse, and from larvæ of *Salamandra*. To avoid undue contraction of the muscles the whole extremity was employed; it was fixed in Perenyi's fluid or in concentrated sublimate solution plus 2 per cent acetic acid. The sections, 5 μ thick, were stained either in thionin or in Heidenhain's iron-hæmatoxylin, followed by Bordeaux R or eosin.

In the quiescent nuclei of embryonic or larval muscle cells the chromatin constitutes a thin layer at the periphery of the nucleus, which contrasts sharply by its blue color with the single brilliant red nucleolus. That the nuclei are highly elastic is shown by the flattened forms they assume in muscles that have strongly contracted owing to their being cut away from their attachments to bone before fixing.

Nuclear reproduction takes place both by the mitotic and by the amitotic process. The author has observed all stages of mitosis in muscle fibres that were already distinctly striped, not only in the deep nuclei, but also in those that had already attained a peripheral position. The approaching division is indicated by an increase both in the size of the nucleus and in the distinctness of the chromatic network. The nucleolus disappears. The fibrillæ next the nucleus separate a little from each other, and a clear fluid plasma accumulates around the nucleus. If this is a marginal nucleus, it protrudes with its enveloping plasma beyond the surface of the fibre.

Special attention was directed to the question of the presence of centrosomes. Though previous observers have never announced the existence of centrosomes in differentiated transversely striped muscle

¹ Godelewski, E., Jr. Ueber die Vermehrung in den quergestreiften Muskelfasern der Wirbelthiere, *Bull. de l'Acad. des Sciences de Cracovie*. Avril, 1900.